New funding will stimulate alternative energy research

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Los Alamos to play key role in four geothermal projects funded by ARRA

Los Alamos, New Mexico, November 16, 2009—Initiatives to provide geothermal heating or power at the Pueblo of Jemez and the New Mexico Institute of Mining and Technology campus are receiving Los Alamos National Laboratory assistance, thanks to recent American Reinvestment and Recovery Act (ARRA) funding.

The Laboratory recently received notice that it has received ARRA funding—known colloquially as stimulus funding—to participate in four geothermal projects with Pueblo of Jemez, New Mexico Tech, and the University of Utah. The funding will enable Los Alamos researchers to provide expertise and technological tools to the partnering entities. The stimulus awards total about $1.2 million to be applied over the next one to three years.

At the Pueblo of Jemez, Laboratory researchers will assist pueblo and state officials in determining whether a geothermal spring can be used to provide warmth, power, or agricultural support to the pueblo and perhaps nearby communities. Los Alamos geologists, geophysicists, and geochemists will assist other experts in characterizing the spring and its geothermal potential. Based on the outcome of these investigations, the pueblo may drill a geothermal test well that could be used to generate steam for electrical turbines, or hot water for heating or for greenhouses or fisheries. The project is scheduled to take two to three years to complete.

Working with New Mexico Tech, the Laboratory will provide computer software tools, as well as training on the use of these tools, to help the university develop a geothermal well to heat the university. Los Alamos has considerable expertise in the development and use of computer models to determine the flow of fluids through layers of rocks and whether fluids will react chemically with geologic formations and potentially have an adverse impact on the extraction of geothermal energy. Los Alamos will assist the university in using the computational tools to characterize the capacity and heating potential of the university's planned geothermal system.

The Laboratory will undertake two separate projects with the University of Utah

In one project, Los Alamos will partner with the university to develop and demonstrate a new class of chemical tracers that can be used to determine heat transfer characteristics of geothermal reservoirs. Such knowledge is important because it allows

researchers to determine how efficient an area may be in heating water for geothermal use, or whether fluids within a reservoir will bypass favorable heating areas through alternate underground channels that may not be able to heat fluids as effectively as other areas within a geologic formation.

Los Alamos researchers will design and interpret tracer tests using quantum-dot-nanocrystal tracers being developed at the University of Utah. Quantum-dot-nanocrystal tracers are extremely small, brightly fluorescing crystals surrounded by a shell of material that can be designed specifically to react or remain inert with geothermal reservoir rocks. When combined with traditional tracers, these new tracers can help researchers better determine the efficiency of heat transfer within a geothermal reservoir. This knowledge can, in turn, help managers choose optimal locations for new geothermal wells or make operational decisions to optimize heat extraction efficiency in existing geothermal well fields.

In the other project with the University of Utah, Los Alamos researchers will work with university researchers to use a massively parallel three-dimensional reservoir simulator called PFLOTRAN to determine the potential for use of water and carbon dioxide as a geothermal fluid. The PFLOTRAN Code—developed under the U.S. Department of Energy Scientific Discovery through Advanced Computing (SciDAC-2) program—can simulate liquid flow through geologic formations and chemical interactions with the host rock.

The study will focus on the use of carbon dioxide as a supercritical fluid. Supercritical fluids are subjected to pressures and temperatures that give them properties of both a gas and a liquid. Supercritical carbon dioxide has potential advantages in geothermal reservoirs because it may be less reactive with rock than brine solutions or other potential geothermal fluids. The computer code will be used to model the behavior of supercritical CO2 in a geothermal system. Researchers will then attempt to validate the computer models to predict fluid behavior in a desired location. The project may also help researchers determine effective methods for sequestering greenhouse gasses in geologic repositories so the gasses can’t contribute to global warming.

Los Alamos National Laboratory has applied for stimulus funding for myriad scientific endeavors related to renewable and alternative energy, nuclear physics and materials technology, health research, and fossil fuels. To date, the Laboratory has been awarded more than $30 million in ARRA funding.